



Photo by Terry Leibold

Technicians at Marshall prepare an X-33 liquid oxygen tank for testing this month.

X-33 liquid oxygen test tank stress tests under way at Marshall

by Jack Robertson and Phil Best

A duplicate of a major component of the experimental X-33 technology demonstrator — its liquid oxygen tank — is undergoing a series of stress tests at the Marshall Center.

Tests began Tuesday on the approximately 6,000-pound, dual-lobe aluminum tank designed to carry 181,000 pounds of liquid oxygen.

It's a structural test article and back-up flight tank and is identical to the flight tank. The oxygen tank is part of the X-33 fuselage structure, forming the forward third of the technology demonstrator. Twin hydrogen tanks form the flanks of the triangular-shaped vehicle.

The X-33 and future reusable launch vehicles must use tanks that not only hold propellant, but also conform to the vehicle

shape and support fuselage loads from landing gear, control surfaces and thermal protection systems.

During testing of the tank, Marshall engineers will apply internal pressure and external loads to the tank. Conditions will simulate pre-takeoff, takeoff, ascent, return and landing.

The Marshall team will use water instead of super-cold liquid oxygen to simulate internal pressure loads. Engineers already have a good understanding of the effects of extremely cold temperatures on aluminum. Hydraulic struts attached to the tank's exterior will simulate external forces experienced by the tank during a mission.

Once the Marshall testing is complete,

See X-33 on page 4

Marshall's Quattrochi cited as world leader in remote sensing by geographers' association

by Gay Watson

Marshall's Dr. Dale Quattrochi has been recognized as a world leader in the field of thermal infrared remote sensing by the Association of American Geographers.

The association's Remote Sensing Specialty Group presented Quattrochi with its Outstanding Contributions Medal for 1999 at the group's annual convention in Hawaii.

Quattrochi is a geographer and senior remote sensing research scientist at NASA's Global Hydrology and Climate Center at Marshall. The Outstanding Contributions Medal is the only award presented in the remote sensing field by the Association of American Geographers. Quattrochi is one of only two NASA or non-academic researchers to receive the

award since its inception in 1980.

At the convention, Quattrochi presented findings from a major NASA study of Atlanta's land use, temperature and air quality. The study investigated how the growth of the Atlanta metropolitan area in the last 25 years has influenced development of the urban heat island effect over the city.

The project found a relationship between land use and land cover change, expansion of the "urban heat island" over the city and air quality of the Atlanta urban area.

Quattrochi earned a doctorate in geography from the University of Utah in Salt Lake City, a master's degree from the University of Tennessee in Knoxville and a bachelor's degree from Ohio University in Athens.



Dale Quattrochi

He and his wife Libby reside in Huntsville with their children Laura and Michael.

The writer, a contractor employed by ASRI, supports the Media Relations Office.

"The need for safety never sleeps"
— Safety slogan submitted by
David Stephenson, EE41



Photo by Dennis Olive

Rodney Grubbs, left, and Justin Jackson, right, of the Information Systems Services Office, and Sharon Hancock of Computer Sciences Corp. discuss information technology products and services with Marshall employees at the Tech Expo '99.

ISSO sponsors Technology Expo '99

In cooperation with the Small Business Office, Marshall's Information Systems Services Office (ISSO) sponsored the Technology Expo '99 on April 7 to acquaint Marshall employees with current information technologies. The office is responsible for implementation of products and services in multimedia, data processing, Internet, television, communication networks, computing systems, telephone, conference room and customer support into the Marshall workforce.

Securing Marshall's information technology investment

by the Protective Services Office

The Marshall Center today is increasingly dependent on interconnected, networked automated data and information systems to work with partners and customers worldwide. Information technology and its use in everyday operation — from e-mail to mission-critical data processing — has become integral to all aspects of Center operations.

However, with this comes an increased risk of unauthorized computer and network intrusions and misuse. Our information technology adversaries are more powerful than ever. Subsequently, as more of our information is processed by electronic systems, sophisticated attacks against our infrastructure are on the rise.

Protecting information systems and applications necessary to NASA projects, programs and missions is an issue that requires an effective and coordinated response.

NASA Administrator Dan Goldin recently said, "The security of our information is absolutely vital to our continued success in the eyes of Congress, the administration and the American people. Valuable information in any form, both classified and unclassified, must only be given to people who are authorized to receive it. Information must be protected from deliberate acts to steal it, modify it, or deny its use, or negligent handling that allows its misuse."

Steve Jones recently was named Marshall's information technology security coordinator. He leads an information technology security team for the development of a comprehensive

Centerwide information technology security program.

The team brings together the Information Systems Services Office, Protective Services Office and information technology resource users to implement federal, NASA and Marshall policies into an effective information technology security program.

This new program will work to strengthen Marshall's information technology infrastructure through personnel training, resource inventory and risk assessments, security planning, secure network engineering, resource intrusion detection and virus detection and response.

The program will include publication of security awareness information in the Marshall Star, Password and "Inside Marshall," periodic presentations and briefings on current security threats and defensive measures, as well as other public awareness activities. These are all designed to keep Marshall employees and on-site contractors informed about the threats to our information systems, and effective measures to be taken to counter these challenges.

The effectiveness of Marshall's information technology security program ultimately depends on the determination and vigilance of each person for responsible, secure use of our information technology investment — from the use of strong, effective passwords, to the proper administration of our many networked information systems.

Remember, "information technology security begins with you!"

For additional information on information technology security, call Jones in the Protective Services Office at 544-4373.

Health & Fitness Expo '99 set

by David Thaxton

Marshall's 2nd Annual Health & Fitness Expo will be held April 21 from 10 a.m.-1 p.m. at Bldg. 4752. All NASA employees, retirees, dependents and contractors are invited.

Marshall's Medical Center and the NASA Exchange will host a wide variety of medical and health-related exhibits and demonstrations.

During the expo, the Annual Fitness Walk — a 1-mile trek through the picnic area adjacent to Bldg. 4752 — will be held at 11 a.m. There will be "hands-on" exhibits, products for attendees to sample and buy, and door prizes will be given away.

For more information, call David Thaxton or Ben Anderson at the Medical Center at 4-2390 or Pat Mirandy at 4-7570 at the NASA Exchange.

The writer is Marshall's Occupational Health Officer.



Photo by Terry Leibold

Marshall/JPL co-host propulsion workshop

Dave Christensen of Lockheed Martin Corp., left, and Homer Hickam, a Marshall retiree and author of the book, "Rocket Boys," visit during the Advanced Propulsion Workshop held April 5-8 at the Tom Bevell Center in Huntsville. The workshop was hosted by Marshall and the Jet Propulsion Laboratory (JPL) in Pasadena, Calif.



Photo by Doug Stoffer

Contractors meet with Center director

Center Director Art Stephenson, right, met with Marshall's contractors at the Center Director's Breakfast Tuesday. Stephenson discussed safety goals, the Marshall reorganization and contracting activities at the event in Bldg. 4203.

Marshall launches balloon to capture meteoroids

Marshall scientists on April 11 released a weather balloon designed to capture cosmic meteoroids flying through the stratosphere. It ascended to a maximum altitude of 95,000 feet where it burst, as planned. The payload descended by parachute to a location near Pinson, Ga.

Links to replays of the flight can be found on: www.StarTrails.com

The payload included a xerogel microparticle capture device, similar in some respects to the cosmic dust collector on NASA's Stardust spacecraft, as well as a digital video camera to record a balloon's-eye view of the flight.

The flight was part of a campaign by NASA scientists that began with a balloon flight in November 1998 during the Leonids meteor shower.

A remotely controlled video camera attached to the balloon recorded its ascent into the stratosphere. At first, the downward-looking camera showed the earth, the horizon and distant clouds as illuminated by the setting sun. The more than 2-hour flight continued after sunset and the camera pointed to show the night sky as viewed from the stratosphere. All video recordings were transmitted to ground receivers and rebroadcast live over the Internet.

More information about the balloon launch is available on the "Inside Marshall" Website at: <http://inside.msfc.nasa.gov>

Obituaries

Queen, Kenneth, 76, Huntsville, died March 12. He retired from Marshall in 1973 where he worked as a program analyst. He is survived by his wife Shirley Queen.

Lahser, Heinz, 91, Achern, Germany, died April 11. He retired from Marshall's Computation Laboratory in 1973 where he worked as an electronics engineer. He joined Marshall in 1957 and was part of the team that worked with Dr. Wernher von Braun's team of scientists. He is survived by his wife Hedwig Lahser.

X-33

Continued from page 1

the tank will be cleaned, X-rayed, insulated and shipped to NASA's John Glenn Research Center in Cleveland, Ohio. The tests there will be used to evaluate operations with colder-than-normal liquid oxygen and liquid hydrogen, with a flight weight tank.

Originally, the test was to be performed in the same facility as composite hydrogen tanks in the West Test Area, but test schedule conflicts emerged late last year. The oxygen tank test team was challenged to locate, design and build an alternate test site without impacting the program schedule. The team did it in about 16 weeks. An existing test pad behind Bldg. 4619 was selected and tested for adequacy in anchoring the reaction structure. It was an outstanding effort from all disciplines involved: design, stress, fabrication services, test and transportation to make this happen on this schedule.

Lockheed Martin Michoud Space Systems in New Orleans, La., designed and built the tank. It arrived at Marshall in February.

The 26-foot-long flight aluminum liquid oxygen tank was placed in the X-33 assembly structure early last year.

The X-33 is a half-scale, sub-orbital technology demonstrator of a future reusable launch vehicle. It's being developed under a cooperative agreement between NASA and the Lockheed Martin Skunk Works in Palmdale, Calif. Managed for NASA by Marshall, the program is to demonstrate advanced technologies that will dramatically increase reliability and lower the cost of putting a pound of payload into space from \$10,000 to \$1,000.

The X-33 is scheduled to conduct flight tests beginning in mid-2000. It eventually will fly faster than 13 times the speed of sound and at an altitude of 60 miles to prove its technologies and systems.

Robertson, a contractor employed by ASRI, supports the Media Relations Office. Best is an X-33 project engineer.



Photo by Emmitt Given

Marshall judges Student Involvement contest

Marshall Center employees and contractors served as judges recently for the NASA Student Involvement Program competition. Marshall was one of seven NASA centers judging the competition that awards students in grades K-12 for their involvement in science, mathematics, technology and geography. The national student involvement program includes investigations and design challenges that link students directly with NASA's missions of research, exploration and discovery.

X-33 scale model successfully completes tests

by John Suter

A 2.25 percent scale model of the X-33 flight demonstrator was successfully hot fired over 100 times during February and March at Marshall's Nozzle Test Facility.

The model was developed by the Qualis Corp. of Huntsville, under the NASA Small Business Innovative Research Program for Marshall's Fluid Dynamics Analysis Branch.

The model simulates for a few milliseconds the propulsion system hot exhaust gases of the X-33, and provides data useful in quantifying and validating the thermal environment in the aft end of the vehicle during powered flight. Typically, a test of this type provides data which can be scaled to the flight vehicle and compared with the plume-induced thermal environment design predictions.

These environments are important because they dictate the thermal protec-

tion system for the vehicle during flight and have a major impact on the vehicle weight, performance and flight safety. The model test data supplement computational predictions of the base region flow fields and environments generated earlier in the design cycle by Marshall — a partner with Lockheed Martin Skunk Works of Palmdale, Calif., in the development of the X-33 flight demonstrator.

The test program was performed jointly by Fluid Dynamics Analysis Branch and Experimental Fluid Dynamics Branch. During the tests, the model was repeatedly fired over a range of simulated altitudes from sea level to approximately 100,000 feet to provide data for comparison with the sub-orbital demonstration flight planned for the X-33 in the summer of 2000.

The writer works in the office of Space Transportation Systems Chief Engineers.

Upcoming Events

Marshall releases FY '98 Annual Report — Marshall's Fiscal Year 1998 Annual Report is available for viewing on the "Inside Marshall" Website. The report covers Center activities from Oct. 1, 1997, through Sept. 30, 1998, and includes Marshall science and technology highlights, institutional highlights, public outreach activities and the Center financial statements.

All hands meeting — All civil service and contractor employees are invited to join Center Director Art Stephenson in Morris Auditorium April 23 at 8:30 a.m. for the next Marshall all hands meeting. It will be broadcast via closed-circuit television for those unable to attend.

Security update briefings — Makeup sessions of the Security Update Briefings will be held April 21 and May 5 from 9-10 a.m. in Morris Auditorium. This briefing is mandatory for all Marshall employees and on-site contractors.

Earth Day activities — The Global Hydrology and Climate Center is hosting an open house April 22 from 1-3 p.m. Bus service will be provided from Marshall. A tree planting ceremony will be held at Marshall Center April 23 at Bldg. 4650 from 10-11 a.m.

Quality Thinking

Use QSDN system to report deficiencies

by Tom Dollman

What should you do when you discover a problem with Marshall's Quality Management System?

The Quality System Deficiency Notice (QSDN) system is one way to report and document a Quality Management System deficiency that requires corrective action under the Corrective Action System. The QSDN database is one of the "Hot Topics" available by clicking the rotating bar at "Inside Marshall," located at: <http://inside.msfc.nasa.gov/INSIDE/>

More details about the QSDN system are available in the document MSFC-P14.1-C03, "Quality System Deficiency Notice System" obtainable from the ISO Document Library at: <http://masterlist.msfc.nasa.gov/>

The better the Quality Management System operates, the easier it is to consistently deliver quality products and services to customers.

For more information, call Tom Dollman in the Technology Transfer Office at 544-6568.

The writer works in the Technology Transfer Office.

Construction safety reminder: Avoiding barricades increases risk

by Nelson Olinger

In the office space and laboratory environment at Marshall, many people do not think construction safety applies to them. But safety applies to everyone.

In many locations at Marshall, construction activities are under way to renovate existing facilities, provide new capabilities or make changes to accommodate personnel moves.

Typically a construction contractor is required to identify a construction area with a barricade — either warning tape, netting or a rope with streamers. The barricades are provided to keep unauthorized personnel from entering a hazardous work area.

There have been several incidents recently when people have gone around barricades to save a few extra footsteps. By going around a barricade they are placing themselves at an increased safety risk and violating the principle of practicing safety.

If you encounter a barricade while moving about at Marshall, please seek an



File photo

The barricade outside Bldg. 4610 near the cafeteria identifies a construction area. Barricades are provided to keep unauthorized personnel from entering a hazardous work area.

alternate route to your destination. If you see someone going around a barricade, remind them of the dangers and encourage them to practice safety.

The writer is a construction project manager with the Facilities Services Office.

Employee Ads

Miscellaneous

- ★ 14' tri-hull fishing boat, 25HP Evinrude and trailer, \$900 obo. 881-6143
- ★ Bike, Yamaha, Virago, 1993m XV-750, black, 16K miles, \$4,000. 837-2461
- ★ Kenwood TS-440SAT HF radio, PC ready, 270Hz CW filter, hand mic, \$650. 881-0533
- ★ Computer desk, \$10. 837-7185
- ★ Clear plastic cases for Beanie Babies and collectibles, \$2.50 each. 498-2116
- ★ Welsh baby crib with mattress, oak finish, \$80. 828-7377
- ★ Blue and white striped couch that makes into a bed, \$200. 584-6742
- ★ Ford F150 A.R.E. black bed cover, fits '97-99 models, \$450. 890-0297
- ★ Taurus, PT-100, 40 cal. w/Hogue grips, extra magazine w/holster, \$335. 379-3606
- ★ Variegated hosta, \$1.60 each; variegated "monkey grass," quart clump, \$1. 881-0278
- ★ Honey bees and equipment. 859-1246
- ★ Piano, upright, built in 1880s by McPhail, decorative panels, \$250. 776-3504
- ★ Sofa, 4 tables, dining table w/6 chairs, credenza, sofabed, sewing machine, dresser, wheelchair. 880-8134
- ★ Bass boat, aluminum, 16', 50HP, Mercury, power T&T, trolling motor, depth finder, \$2,350. 880-2229
- ★ Loveseat sleeper sofa, good condition. 971-1414
- ★ Women's sandals, Birkenstock, suede, taupe, size 9M, never worn, \$65. 881-2274
- ★ Fifth-wheel travel trailer, 21', 1991 Shadow Cruiser, fully equipped, hitch available, \$6,500. 971-1207
- ★ 1988 Evinrude outboard, 17', 88HP, V-hull boat and trailer, power tilt/trim, full instrumentation, ski equipment, \$1,500. 859-6475 evenings
- ★ Little Tykes stable with horses, \$15. 721-0617
- ★ Leather couch, \$450; kerosene heater, \$40; Exercycle, \$55; radar detector, \$50; washstand, \$200. 881-4748

Vehicles

- ★ 1991 Volvo 740, power windows/door locks, \$7,950. 837-0846
- ★ 1989 Camaro convertible, red, V8, AC, power windows, cruise, new top, \$5,200. 230-1274
- ★ 1982 Honda Accord LX, hatchback, 5-speed, air, radio, approx. 92K miles, \$1,200 obo. 859-0083

- ★ 1995 Nissan King Cab pickup, 4WD, SE, V6, \$13,500. 512-9966
- ★ 1993 Honda Accord LX, auto transmission, new tires, 115K highway miles, \$9,500. 350-2999
- ★ 1993 Nissan 300zx 2.2, t-tops, am/fm/CD Bose system, air, pw/ps, 5-speed, 38K miles, \$15,000. 883-6496
- ★ 1990 Honda Accord LX, 104K miles, 5-speed, CD player, \$5,400 obo. 512-5679
- ★ 1988 Mercury Sable LS wagon, loaded, \$2,200. 828-6213
- ★ 1986 Honda Civic, 4-door, 1.5L, 5-speed, air, AM/FM cassette, \$1,500. 586-7375
- ★ 1994 Chrysler Concord, 3.5 liter engine, 58K miles, fully equipped, \$11,000. 883-0313
- ★ 1995 Mercury Villager LS, new tires and battery, fully equipped, 58K miles, \$13,750. 464-0439
- ★ 1997 Ford Taurus GS, black, fully equipped, 29K miles, leather, new tires, 4-door, \$12,900. 353-5358
- ★ 1995 Mazda Protégé LX, 4-door, gold, auto, 90K miles, AC, power windows, cruise, \$5,955. 837-8487
- ★ 1987 Mazda 626 LX, 4-door, 5-speed, 135K miles, tilt, cruise, air, all power, white, \$2,400. 721-9601

Wanted

- ★ Two-drawer storage bins for 24 VHS video tapes. 881-6595
- ★ Child carrier backpack w/hip belt, Kelty or similar, not Gerry. 650-5128

Center Announcements

- ☛ **MARS Tennis Club** — The MARS Tennis Club held its first tournament of the season April 1. The winners of the April Fool's Day Tournament were: Group A: 1st: Tony Kim and Paul Mann; 2nd: Scott May and Larry Craig. Group B: 1st: Amy Hemken and Ronda Moyers; 2nd: Larry Newman and Richard Wilson. The Henry Rupp Hi-Lo Tournament will be for May 1.
- ☛ **Great Moonbuggy Race** — The 6th Great Moonbuggy Race is being held Saturday from 8:30 a.m.-6 p.m. at the U.S. Space & Rocket Center. The race challenges high school and college students to design and build a human-powered, test-model vehicle to address engineering problems similar to those faced by the original Marshall Center lunar rover team. To volunteer to help with the event, call Tammy Rowan at 544-8706.
- ☛ **CFC Solicits Slogans** — Campaign slogans are

being solicited for the 1999 Tennessee Valley Combined Federal Campaign (CFC). The chosen slogan will be used for in publications, training, training materials and activities. Slogans should be submitted before May 4. For more information, call Glen Allison at 876-4298.

- ☛ **Shuttle Buddies** — The Shuttle Buddies will meet for breakfast at 9 a.m. Monday, April 26, at Shoney's on University Drive West. For more information, call Deemer Self at 881-7757.
- ☛ **MESA Meeting** — All Marshall Engineers and Scientists Association (MESA) members are invited to the monthly membership meeting April 22 at 11:30 a.m. in Bldg. 4471, room C-105.
- ☛ **Fitness Activities** — The Health and Fitness Expo and the Annual Fitness Walk will be held April 21 at Bldg. 4752. The expo is 10 a.m.-1 p.m.; the walk begins at 11 a.m.
- ☛ **Alabama A&M Gala** — Tickets are available for the First Annual William Hooper Council Gala at Alabama A&M University. The gala is set April 30 at 8 p.m. in the T.M. Elmore Bldg. To purchase tickets, call Rosa Kilpatrick at 4-0042. Cost is \$25.
- ☛ **MOO Retirees Meet** — The Management Operations Office retirees will meet for breakfast/lunch April 22 at 10 a.m. at the Cracker Barrel in Madison. All present or former MOO members are welcome. For more information, call 539-0042.
- ☛ **Semiannual Bookfair** — The semiannual Bookfair, sponsored by the NASA Exchange, will be held April 27-29 from 8 a.m.-4 p.m. in Bldg. 4203, room 1201. A selection of bestsellers, cookbooks, decorating, sports and children's books will be available for purchase at a savings. For more information, call the Exchange Office at 4-7564.
- ☛ **April Blood Drive** — The American Red Cross is holding its monthly blood drive Friday from 8 a.m.-1:30 p.m. in Bldg. 4752. The schedule is: A-B, 11 a.m.; C-F, 10:30 a.m.; G-H, 10 a.m.; I-L, 9:30 a.m.; M-O, 9 a.m.; P-S, 8:30 a.m.; and T-Z, 8 a.m. If you are unable to make your appointed time, the Red Cross will be available until 1:30 p.m. Marshall employees who serve as blood donors without compensation will be authorized four hours of excused absence. Contractors will comply with their company's policy.

Job Opportunity

CPP 99-29-JB, Supv. AST, Liquid Propulsion Systems, GS-861-15, Space Shuttle Projects Office, Solid Rocket Booster Project. Closes April 19.

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